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AN/SLQ-32 Operator Training: Development of Performance Assessment Instrument

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Navy surface Electronic Warfare Technicians (EWs) are responsible for both surveillance of electronic emitters and for antiship missile defense (ASMD). No assessment of *individual* operator performance exists in the fleet. However, various Navy research and development efforts require such performance measures for EW operators. Therefore, an AN/SLQ-32 operator performance assessment instrument (or checklist) was developed to record and assess individual proficiency in terms of intermediate measures of effectiveness within the domains of (1) Identify/Correlate Emitters, (2) Communications, (3) Countermeasures, and (4) System Operation. This report describes the development of a performance-based instrument to measure proficiency in these domains.

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Foreword

This effort was sponsored by the Chief of Naval Personnel (PERS-01J11) (Program Element 0603707N, Work Unit L1772-ET103) and by the Chief of Naval Research (Code 34) (Exploratory Development Program Element 0602233N, Work Unit RM33T23.08) as part of the Surface Combat Operator Training (SURCOT) project.

This technical note describes the development of an instrument to assess performance of Electronic Warfare Technicians (EWs) in the operation of the AN/SLQ-32. This instrument can be used to (1) evaluate the effectiveness of various training interventions and (2) identify expert equipment operators.

J. C. McLACHLAN
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Summary

Problem

Performance problems associated with the operation of the AN/SLQ-32 for both surveillance of electronic emitters and for antiship missile defense have been reported, but there is no existing individual operator assessment instrument in the fleet to identify/verify the performance problems.

Objective

The overall objective of the Surface Combat Operator Training (SURCOT) project is to investigate and identify training interventions to improve AN/SLQ-32 operator skills; specifically, to reduce operator performance degradation over time, reduce performance variability, increase operator consistency and precision, and reduce perceived workload.

The objective of the work summarized in this technical note was to develop an assessment instrument for AN/SLQ-32 operators that can be used to describe operator skills, to discriminate between effective and ineffective operator performance, and to measure the effects of the training interventions designed to improve operator performance.

Approach

An initial list of operator skills was developed based on review of training documents, fleet training requirements, occupational standards, and fleet Electronic Warfare (EW) exercises. Additionally, three EW Technicians (EWs) were observed using an AN/SLQ-32 Operational Training Device in an operational scenario. Based on these inputs, a preliminary assessment instrument was compiled and reviewed by fleet evaluators. This instrument was used and revised during pilot tests of 19 AN/SLQ-32 operators from ship and shore commands.

Results

The resulting performance assessment instrument assesses performance under the following four primary skill areas: Identify/Correlate Emitters, Communications, Countermeasures, and System Operation.

Conclusion

The performance assessment instrument can assess AN/SLQ-32 operator performance; specifically, it can be used to describe operator skills, to discriminate between effective and ineffective operator performance, and to measure the effects of training interventions designed to improve operator performance.

Applications

This performance assessment instrument was used to assess the impact of three training interventions on AN/SLQ-32 operator performance and to discriminate between effective and ineffective operator performance in order to identify expert operators.

Contents

Introduction

Problem

Apprentice level Electronic Warfare Technicians (EWs) are responsible for operating the AN/SLQ-32 as part of their watchstanding duties. Operators are slower than deemed acceptable in the detection, recognition, and evaluation of intercepted signals using the AN/SLQ-32, which degrades a ship's overall capability to evaluate and counter threats. Four areas contribute to operator problems: (1) the dilemma between the ship's need for hard, deterministic data and the probabilistic data provided by the AN/SLQ-32, (2) management of surges in operator workload, (3) skill degradation during periods of inactivity, and (4) lack of a concise and accurate "mind's-eye" view of the tactical situation.

Objective

The overall objective of the Surface Combat Operator Training (SURCOT) project is to investigate and identify training interventions to improve AN/SLQ-32 operator skills; specifically, to reduce operator performance degradation over time, reduce performance variability, increase operator consistency and precision, and reduce perceived workload.

The objective of the work summarized in this technical note was to develop an assessment instrument for AN/SLQ-32 operators that can be used to describe operator skills, to discriminate between effective and ineffective operator performance, and to measure the effects of the training interventions designed to improve operator performance.

Background

The AN/SLQ-32 is an antiship missile defense (ASMD) electronic detection system that uses computer-aided processing for automatic and instantaneous identification of intercepted signals. Its primary purpose is to augment ship defense against antiship cruise missiles and other weapons of similar radio frequency characteristics. Its secondary purpose is to detect and identify electromagnetic (EM) emissions within the ship's operational area. It is typically operated by the junior EWs aboard ship, while senior EWs in the division are responsible for supervisory and coordinating duties.

There is currently no assessment of individual AN/SLQ-32 operator performance. While supervisor ratings may be available, Vineberg and Joyner (1982) note that the correlations between such ratings and sample tests of proficiency have been low. According to a report[1] of the Electronic Warfare inter-fleet working group (EWIWG), there is a:

> Need to establish [a] standardized and effective method of measuring the operational proficiency of EW personnel. Currently, a wide variety of vehicles are available to test EW operators. In fact, the volume of test results far exceeds our ability to analyze and utilize the results. The problem is further exacerbated by the fact that each Fleet uses different testing methods, periodicity, and analysis tools. In addition, there are no [appropriate] measures of effectiveness in use upon which to base Navy-wide skill and knowledge measurement. (pp. 4-5)

An individual multiple-choice test (ELW-24-SF) administered prior to Refresher Training (REFTRA) primarily focuses on recognition of various radars, publications, and reporting methods.

[1] From CNO ltr Ser 35/1U588232 of 8 Jan 91.

Additionally, Fleet Training Groups (FTGs) conduct assessments of the performance of the EW division by watch section prior to ship deployment. FTG San Diego, for example, conducts 2 to 4 weeks of REFTRA for the crew of each ship approximately every 18 months, depending on rotation and world events. They employ 10 of the 24 EW exercises (EWEXs) available. Instructors from FTG observe shipboard exercises using battle scenarios and evaluate group performance. The performance evaluation during these EWEXs examines preparation of the EW watch section for watchstanding, signal classification, reporting procedures, employment of countermeasures, and information flow. After REFTRA, a numeric score with a verbal rating summary (e.g., outstanding, satisfactory) is forwarded to the ship's commanding officer and the type commander (TYCOM). Individual performance is not noted except when exceptionally good or poor.

Even though the REFTRA exercises evaluate the EW *division* aboard ship and not the individual operator, some work has been previously accomplished in individual EW performance. Past experimental measures of EW operator effectiveness include both time and accuracy of emitter (radar) identification, and correlation (matching) of those radars with their associated platforms. However, the measures were restricted to only one of the many operator tasks and were conducted with limited simulation capabilities.

Guidelines for the evaluation of individual performance of other Combat Information Center (CIC) operator watchstanders have been established in the past. Mackie, Ridihalgh, Seltzer, and Shultz (1981) stated that any test of individual sonar operator performance must be as operationally realistic and as comprehensive as possible; that is, it must measure each major element of operator performance, such as search procedure, target detection and reporting, target tracking and localization, and target classification. Their guidelines agree with those presented by Grodsky (1967) and by Alluisi (1969) (see Appendix A) in terms of their applicability to skill performance assessment.

Approach

An individual performance assessment instrument must encompass the range of tasks required of the watchstander. For the AN/SLQ-32 operator, it must be sensitive to his propensity to consult references (such as the Electronic Order of Battle [EOB] and messages), the types and frequency of use of the Fixed Action Buttons (FABs) on the console, the number and types of detected emitters acted upon, operator initiated reports (disseminating information) to the battle group's EW information coordinator (Alpha Echo [AE]) and to the Tactical Action Officer (TAO) on board ownship, responses to requests for information from AE and TAO, and operator initiated countermeasures to high-threat emitters.

Identify Skills of Interest

Training documents, fleet training requirements, and occupational standards (including the *AN/SLQ-32 (V) Countermeasures Set Operator Training, Software User's Manual,* 1991; *EW Continuum Training Plan*, 1990; ; *EW Operator Training: Topic Learning Objectives*, 1990; and *Navy Enlisted OCCSTDs*, EW, 1993) were reviewed to produce a preliminary list of skills and Measures of Performance (MOPs). This list was sent to subject matter experts (SMEs) for review and comment. Table 1 lists the revised skill areas and skills. The criticality of the skill areas to operator performance was inferred by determining their relative importance in the scoring criteria used in the FTG-conducted EWEXs. For example, skills associated with the identification and correlation of emitters are most highly weighted in the EWEXs because they are considered to be the most critical skills.

Table 1

Preliminary List of Operator Skills

Skill Area/Skill	Can be Evaluated Under Controlled Conditions?
Identify/Correlate Emitters	
Preparation for Watchstanding	Partially
Identify electronic-warfare support measure (ESM) receiver types by operating characteristics.	
Memorize selected emitter data.	
Use EW documents and publications to extract needed information.	
Prepare an Electronic Order of Battle (EOB).	
Integrate Information	Partially
Acquire and fuse data from many sources.	
Develop a mental picture of the air/surface/land tactical situation.	
Identify changes in tactical situation.	
Correlate ESM intercepts with onboard sensors	
Correlate ESM intercepts with offboard sensors.	
Correlate ESM intercepts with intelligence.	
Measure Parameters	Yes
Perform mathematical formula conversion and computations on selected ESM signal parameter data.	
Determine radar parameters.	
Perform basic scan recognition and measurement by audio indications.	
Perform basic scan recognition and measurement by visual indications.	
Perform complex scan recognition and measurement.	
Triangulate contact positions using ESM bearings.	
Classify Emitters	Yes
Perform EW signal evaluation utilizing Rapid Evaluation.	
Identify and correlate an intercepted emitter using an EOB.	
Identify and correlate specific emitters.	
Instantaneously identify high-threat emitters.	
Determine emitters that are exhibiting a War Time Reserve Mode (WARM).	
Communications	
Extract Information	Partially
Extract information from EW message traffic.	
Interpret information provided by Naval Space Surveillance (NAVSPASUR) messages.	
Disseminate Information	Partially
Log EW signals of interest.	
Report internal EW information.	
Report external EW information.	
Initiate a Meaconing, Intrusions, Jamming, Interference (MIJI) report by completing an MIJI Feeder report.	
Plot EW information.	
Demonstrate ability to recommend/perform the appropriate action in an antiship missile defense (ASMD) environment.	
Brief watch relief on force disposition.	
Brief watch relief on active emission summary.	
Brief watch relief on threat environment.	

Table 1 (Continued)

Skill Area/Skill	Can be Evaluated Under Controlled Conditions?
Countermeasures	
Assess Situation	Yes
Assess tactical situation to determine impact on emission control (EMCON) posture.	
Initiate Countermeasures	Yes
Perform the appropriate action in an ASMD environment.	
Execute pre-planned responses.	
Recommend use of chaff and infrared (IR) countermeasures.	
Recommend use of offboard active decoy.	
Engage targeting emitters with countertargeting active electronic countermeasures (AECM).	
Perform AECM engagement of detected threats (i.e., missiles).	
Evaluate the effectiveness of either the onboard AECM, offboard decoys, or both.	
System Operation	
Operation	Partially
Recognize and interpret all indications occurring during the setup and performance of the operating procedures and perform appropriate operator actions in the proper sequence on the AN/SLQ-32.	
Recognize and interpret all indications occurring during the setup and performance of the operating procedures and perform appropriate operator actions in the proper sequence on the MK36 Decoy Launching System.	
Perform tasks in the casualty/degraded modes of operation for the Display Processor Group.	
Programming	Yes
Construct an automated emitter library.	

The skill areas in which performance can be measured under controlled laboratory conditions were then identified. The conditions for performance assessment must be controlled to reduce confounding variables while maintaining fidelity to actual shipboard operations. For example, in the laboratory, the operator may report orally to AE and the TAO the classification of detected emitters from hostile platforms in the operational scenario, which is similar to the reporting requirement aboard ship during actual watchstanding. Such tasks are identified in Table 1 as well. However, several components of a skill area may not be replicated for assessment in the lab, and so cannot be evaluated *exclusively* under laboratory conditions. These must somehow be augmented by other measures. For these skill areas, the response to the question "Can [the skill area] be evaluated under controlled conditions?" is listed as "partially" in Table 1.

Procedure

An Operational Training Device (OTD) using the same software load currently used in the fleet was used for the operator performance assessments at NPRDC. The OTD has high physical and audio fidelity to the AN/SLQ-32 Display and Control Console. It provides all operator function and display capabilities, has limited signal select capability to produce realistic audio signals, and is capable of interfacing with external devices for transfer of scenario event data. The performance assessment instrument was used with an operational scenario based on one currently used by the fleet to ensure tactical soundness and face validity. The scenario was modified to (1) provide a

certain level of ambiguity in the automatic classification of detected emitters, (2) provide variations in workload, and (3) be of sufficient duration to permit assessment of the operator's development of a "mind's eye view" of the tactical situation.

Materials and references (such as friendly and threat EOBs, a maneuvering board [moboard] depiction of own force disposition, intelligence messages, and logkeeping sheets) normally available to the operator aboard ship were supplied to the operator/subject. Two E-5s from the Navy EW Training Aid Program (NEWTAP) served as AE and ownship TAO to provide subjects with the opportunity to gather information and disseminate reports. The acting AE and TAO were provided with scenario summaries, watch prebrief, a table of scenario events (with library classifications of emitters), expected reports, and polar displays at 5-minute interval.

While standing watch at the OTD, the operator encountered emitters which the software automatically classified. The surveillance portion of the watchstanding task involved the operator identifying (naming) the emitter based on either his memory or the references supplied. The operator was required to report hostile and commercial emitters and log reports. As the scenario developed, the operator was to counter missiles appropriately (using either active and/or passive resources) and make tactical recommendations.

The impact of changes in workload on operator performance was evaluated in several ways. The main library, preloaded into the OTD, contains parametric data for automatic classification of emitters. However, at times, this classification may be incorrect, be displayed as an unknown, or be applicable to more than one radar. Also, the number of new emitters presented to the operator varies with time. For example, between 3 and 4 minutes into the scenario, six new emitters are acquired. During other 1-minute intervals, however, no new emitters are acquired. The frequency with which emitters become inactive also varies with time. These events also can be considered minor contributors to workload, since the operator must address and respond to such events. Finally, screen clutter, which also contributes to workload, may result from multiple symbols of the same emitter displayed under some conditions, multiple emitters occurring on the same bearing, and failure of the operator to "clear" inactive emitters.

Operator actions and verbal reports were videotaped (using a quad screen to capture views of the display screen, the operator, and the OTD keyboard). All interactions with the software (i.e., FAB and keyboard presses) were recorded and time-stamped by Comptek's Data Extraction (DX) device.[2] Relevant data from DX printouts and videotapes for each operator were used to answer the questions posed in the performance assessment instrument.

Preliminary Performance Assessment Instrument

In a pilot test, the performance of three EWs was videotaped, analyzed, and transcribed to determine what actions AN/SLQ-32 operators did or did not do in classifying and reporting radars and countering missiles. Most of the specific assessments and checks made during REFTRA EWEXs, supplemented by the observations made in comparing operator performance in the pilot test, were incorporated into a list of candidate measures. These checks were defined in terms of their significance (i.e., why they were considered important as performance measures), occasions

[2]Identification of specific equipment is for documentation only and does not imply endorsement.

or events within the scenario in which they could be observed or expected to occur, associated skill areas (from Table 1), and sources from which data could be collected (i.e., videotape or direct recording of all button and keyboard presses through the use of the DX unit). The result was reviewed and annotated by three senior EW evaluators at FTG San Diego for relevance (appropriateness of the measure) and relative importance (to ensure that more important items would be more heavily weighted in the scoring scheme). This first round of review resulted in additional checks (e.g., "To whom does the operator first report?") being incorporated, and construction of a scoring scheme or weighting for relevant items.

Minor revisions to the assessment instrument were made throughout subsequent operator testing. The revisions were based on additional SME comments (from FTG and NEWTAP), observations or "lessons learned" (e.g., strategies used to clear the outer ring of the display; chaff launching procedures), and minor edits to the scenario.

Subjects

Three EWs (two from NEWTAP, one from Fleet Combat Training Center, Pacific) operated the OTD as a pilot test of the laboratory conditions. Subsequently, the performance of 19 subjects was assessed using the OTD (between 10 February and 26 March 1992). Of the 19 subjects, 17 were from ships and two were from shore commands. The majority of ship-based subjects were from cruisers ($N = 10$), the subjects' average rate was E-4, and all subjects had AN/SLQ-32 operational experience.

Results and Discussion

Performance Assessment Instrument

The performance assessment instrument (Appendix B) assesses performance under the following four primary skill areas: Identify/Correlate Emitters, Communications, Countermeasures, and System Operation. The instrument is structured to answer specific performance questions, primarily with a yes or no. Since the behavior in question may be applicable to more than one event in the scenario, all relevant events occurring in the scenario to which the question could apply are listed. A statement indicating the significance of the item is also provided (i.e., why the item should be included as a performance measure). The item "related MOPs" provides a reference to the initial skill list. The source from which relevant data can be acquired also is listed. Finally, a total possible score, or weighting, based on FTG input of the item's criticality, along with directions for scoring, is provided for each item.

The AN/SLQ-32 operator relies heavily on cognitive skills; that is, those skills in which the adequacy of performance can only be inferred from an observable event such as an overt action or report. For example, recognition of a radar emitter as a friend can be inferred either by the absence of an operator report (since only hostile emitters are reported) or the operator correcting the displayed symbology if it is automatically classified as a nonfriend (i.e., hostile or unknown). This makes documenting the performance difficult.

Application

In looking at the performance of the initial group of 19 operators, some operators performed at a higher skill level than did others. Overall, the composite score on the performance assessment checklist was used to assess relative competence. Paygrade was slightly correlated with performance assessment. When the scores of the two senior supervisors (E-6s) were eliminated, paygrade was more highly correlated with the performance assessment. Since many of the skills associated with operation of the AN/SLQ-32 are considered perishable, lower scores at the highest paygrade were to be expected because personnel rated E-6 and above rarely operate the AN/SLQ-32.

The performance scores were also used to identify and quantify (1) expert/novice differences and (2) overall performance deficiencies. For example, high scoring operators reported most of the hostile emitters and did not report any friends that were misclassified as hostiles, they changed misclassified hostile emitters to the correct platform symbology, they listened to the audio presentation of the emitter frequently, they gave an emergency report on fire control radars *before* missile launch, they reported all detected missiles quickly (including the composition of multiple missile launches), and they recalled the locations of most platforms and emitter activity at the conclusion of the scenario. This may be compared with the performance of those who scored much lower.

The low-scoring group reported only half of the possible hostile emitters while reporting a few friends misclassified as hostiles, they never changed misclassified friendly or hostile emitters to the correct platform symbology, they did not listen to the audio signal, they gave no emergency report on fire control radars, they reported an average of two of the three possible missiles (but no composition information) far beyond the fleet time standard, and they recalled locations of only two of five selected platforms at the conclusion of the scenario. Three of the low-scoring operators unsuccessfully launched chaff *after* missiles went inactive.

Conclusions

The performance assessment instrument can assess AN/SLQ-32 operator performance; specifically, it can be used to describe operator skills to discriminate between effective and ineffective operator performance, and to measure the effects of training interventions designed to improve operator performance.

Applications

This performance assessment instrument was used to assess the impact of three training interventions on AN/SLQ-32 operator performance and to discriminate between effective and ineffective operator performance in order to identify expert operators.

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Appendix A

Considerations for Individual Performance Assessment

Considerations for Individual Performance Assessment[3]

1. Content validity.	Tasks appear to include desired content.
2. Construct validity.	Tasks appear to measure the desired functions orthogonally.
3. Face validity, operator acceptance.	Test battery must appear to the operator to measure important aspects of performance; otherwise, performance may reflect fluctuations in operator interest and motivation that are independent of the parameters under study.
4. Sensitivity.	Tasks must reflect genuine performance changes that occur under the conditions of study. The task must reflect appropriate changes created by relevant experimental conditions.
5. Engineering feasibility.	Equipment and software must be within design capabilities and be available at reasonable cost and without major delay. Equipment must be sufficiently reliable to permit sustained use.
6. Task reliability.	Each task must demonstrate high statistical reliability.
7. Flexibility.	Test battery must be easy to modify in terms of stimuli programming and response recording.
8. Workload variability.	Test battery must contain a range of workloads and must include both realistic loadings of the operator and demand for timesharing among the tasks.
9. Trainability.	"Learning" in the operational situation should not be a major variable in the tasks selected; the operator is not expected to learn to perform the functions during the mission.
10. Control-data availability.	Tasks must be adaptable to laboratory investigations; where differences in performance are obtained with different samples of subjects, the differences must be specifiable and able to be related to expected results with other populations.

[3]Adapted from Alluisi (1969), pp. 94-96.

Appendix B

AN/SLQ-32 Operator Performance Assessment Instrument

Note. The statements labeled, Significance, are included to ensure that all raters maintain the same assessment perspective when using this instrument.

AN/SLQ-32 OPERATOR PERFORMANCE ASSESSMENT INSTRUMENT

Operator _____
Date _____
DX Check _____
VT Check _____

- IDENTIFY/CORRELATE EMITTERS -

1. Does the operator report HOSTILE emitters accurately? (Y/N)

a. Emitters which are easier (the OTD classifies correctly):

	Platform	Radar	Time Up	Brg	Y/N	If "N", What Was Actually Reported?
(1)	S17	DON II	3:41	048	___	_____
(2)	S16	OWLSCH	21:38	356	___	_____
(3)	A30/A31	SSN2CMH	22:53	000	___	_____
(4)	A15-17*	DWNBEAT	25:22	293	___	_____
(5)	A26-29*	SHRTHRN	28:00	040 start	___	_____
(6)	A55/A56*	SSN-19	30:30	080 start	___	_____
(7)	A42/A43*	AS4MH	33:09	120	___	_____
(8)	A38/A39*	AS4MH	34:31	294	___	_____

b. Emitters which are more difficult:

	Platform	Radar	Displayed*	Time Up	Brg	Y/N	If "N", What Was Actually Reported?
(1)	S16	PLMFND	SNPPLT	3:15	000	___	_____
(2)	S16	PEELGRP	GEN MSL	4:34	000	___	_____
(3)	A11*	BBULGB	GEN MSL	17:49	345	___	_____
(4)	S16*	PEELGRP	UNK or MSL	22:07	356	___	_____
(5)	S29	SNPTR1	TOPBOW+2	22:14	029	___	_____
(6)	A19-22	PUFFBALL	UNK	33:35	278? start	___	_____
(7)	A44-46	AS-2	SSN2/AS2	35:00	122? start	___	_____

* One or more don't come up consistently

Significance: This item (#1) and #9 seem to be the primary evaluation checks of operator proficiency in terms of evaluating emitters. It would be interesting to see if emitters which are classified by the SLQ correctly are more often reported correctly than those that are classified incorrectly by the SLQ (i.e., does the operator believe the SLQ's classification?)

RELATED MOPs: 11, 14, 16, 17
DATA SOURCE: VIDEOTAPE
SCORE: ___ / 30 **(1 Point for Report but Incorrect, 2 Pts for Report and Correct)**

2. Does operator accept incorrect classifications of friendlies from the OTD? (Y/N)

	Platform	Radar	Symbology Displayed	Time Up	Brg	Y/N	I.D. Reported
(1)	S2	SPS-49	HOS SUR	various	219	___	_____
(2)	S5	SPS-49	HOS SUR	various	080	___	_____
(3)	S4	LN-66	UNK	3:00	260	___	_____
(4)	A5	APG-65	UNK	3:30	020	___	_____
(5)	S2	MK-92	MSL	4:15/26:12	219	___	_____
(6)	A10	RDR-1E	UNK	6:30	220	___	_____
(7)	S7	SPG-55B	UNK	16:35	039	___	_____
(8)	S18	Marconi	HOS SUR	17:09	249	___	_____
(9)	S6	SPG-60	UNK	18:00	129	___	_____
(10)	S6	SPQ-9	UNK	18:01	129	___	_____
(11)	S3	SPG-51	UNK	24:40	309	___	_____
(12)	S12	SPS-40	UNK	various	355	___	_____
(13)	S28	DECCA40	UNK	36:23	320	___	_____
(14)	S7	SPS-67	UNK	45:48	038	___	_____

Significance: In the scenario, the OTD classifies emitters from some friendly platforms as HOS SUR. If the operator gives a racket report on these emitters, it indicates that he is using the automated library as his primary, if not only, source of information for classifying the emitters.

RELATED MOPs: 10, 11, 14

DATA SOURCE: VIDEOTAPE

SCORE: ___
(-2 Points for each Incorrect Report)

3. Does the operator redesignate FND emitters which come up as UNK or HOS using either the DESIGNATE ID or the ENTRY FABs? (Y/N)

	Platform	Radar	Symbology Displayed	Time Up	Brg	Y/N	ENTRY or DESIG ID?
(1)	S2	SPS-49	HOS SUR	various	219	___	_____
(2)	S5	SPS-49	HOS SUR	various	080	___	_____
(3)	S4	LN-66	UNK	3:00	260	___	_____
(4)	A5	APG-65	UNK	3:30	020	___	_____
(5)	S2	MK-92	MSL	4:15/26:12	219	___	_____
(6)	A10	RDR-1E	UNK	6:30	220	___	_____
(7)	S7	SPG-55B	UNK	16:35	039	___	_____
(8)	S18	Marconi	HOS SUR	17:09	249	___	_____
(9)	S6	SPG-60	UNK	18:00	129	___	_____
(10)	S6	SPQ-9	UNK	18:01	129	___	_____
(11)	S3	SPG-51	UNK	24:40	309	___	_____
(12)	S12	SPS-40	UNK	various	355	___	_____
(13)	S28	DECCA40	UNK	36:23	320	___	_____
(14)	S7	SPS-67	UNK	45:48	038	___	_____

Significance: This indicates the operator has correctly classified emitters as friendly, and/or maintains the SLQ-32 polar display over time. The DESIGNATE ID function provides a quick method to redesignate an emitter as a generic HOS/SUR SUB/AIR/SUR or MSL platform. ENTRY (with a menu selection of "5") is a more precise method to designate an emitter with a particular name/platform.

RELATED MOPs: 7, 11, 14

DATA SOURCE: DX UNIT/ VIDEOTAPE

SCORE: ___ / 14 NOTE: Sometimes these are classified correctly by the OTD/library.
(1 Point for each Redesignate)

4. Does the operator redesignate HOS emitters which are incorrectly displayed as other platforms using the DESIGNATE ID or ENTRY FABs? (Y/N)

	Platform	Radar	Symbology Displayed*	Time Up	Brg	Y/N	ENTRY or DESIG ID?
(1)	S16	PLMFND	SNPPLT	3:15	000	___	_____
(2)	A7*	BBULGA	BBULGB	4:01	045	___	_____
(3)	S16	PEELGRP	GEN MSL	4:34	000	___	_____
(4)	A11*	BBULGB	GEN MSL	17:49	345	___	_____
(5)	S16*	PEELGRP	UNK or MSL	22:07	356	___	_____
(6)	S29	SNPTR1	TOPBOW+2	22:14	029	___	_____
(7)	A19-22	PUFFBALL	UNK	33:35	278? start	___	_____
(8)	A44-46	AS-2	SSN2/AS2	35:00	122? start	___	_____

* Not always consistently; sometimes these are displayed correctly.

Significance: In the scenario, some HOSTILE emitters are initially classified by the OTD as different platforms. This check is an indicator that the operator recognizes that these platforms are in fact different than that displayed. [Of additional interest is the reason for redesignating the PALM FROND to a SURFACE platform, since the submarine is a higher priority threat.]

RELATED MOPs: 7, 11

DATA SOURCE: DX UNIT

SCORE: ___ / 16
(2 points if Redesignated)

---

5. Is a quick (30-second) submarine contact reported? (Y/N)

Platform	Radar	Time Up	Brg	Y/N
S29	SNPTR1	22:14	029	___

Significance: There is a "hidden" contact that appears during the initial missile launch and then goes inactive after a minute (30 seconds when running double-time). Most operators might not catch this one. Also of interest here is to determine why he missed the contact...
? Was the speaker OFF? (check #21)
? Were any alerts inhibited? (check #22)

RELATED MOPs: 10, 13, 16

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 2
(2 points if Reported)

6a. How many times did the operator listen to the signal using SIGNAL SELECT? (____)
6b. How many different emitters did the operator listen to? (____)

Significance: Audio analysis of emitters is a technique reportedly used more frequently by good, experienced operators. Then again, there may be some question about the operator's performance if he listens to the same emitter repeatedly.

RELATED MOP: 5

DATA SOURCE: DX UNIT

SCORE: ___ / 2
(2 points if $\geq$ 8, 1 if $\geq$ 5)

---

7. How many times did the operator consult the...
   A. EOB during the scenario? (____)
   B. intel during the scenario? (____)

Significance: These are indicators of what resources (along with audio) the operator uses in order to classify emitters. This is not indicative of proficiency, only descriptive. **Because experienced operators may rely more on memory and less on printed EOBs than inexperienced operators, this should not be scored.**

RELATED MOPs: 18, 23, 41

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 0

8a. Did operator recall location of platforms at scenario end? (___ **/ 10; using questions 1-9 and 13 from the Post-Watch Brief)**
8b. Did the operator recall emitter activity at the end of the scenario? (___ **/ 3; using questions 17-19 from the Post-Watch Brief)**

Significance: Although these may not directly relate to operator performance, this may be indicative of the operator's awareness of the tactical situation.

RELATED MOPs: 25, 32, 33, 34

DATA SOURCE: POST-WATCH BRIEF

SCORE: ___ / 2
(1 point each if ≥ 50%)

- COMMUNICATIONS -

9. How much time did it take to report HOSTILE emitters?

a. Emitters which are easier (the OTD classifies correctly):

	Platform	Radar	Time Up	Brg	Time to Word "Racket" *
(1)	S17	DON II	3:41	048	_____
(2)	S16	OWLSCH	21:38	356	_____
(3)	A30/A31	SSN2CMH	22:53	000	_____
(4)	A15-17*	DWNBEAT	25:22	293	_____
(5)	A26-29*	SHRTHRN	28:00	040 start	_____
(6)	A55/A56*	SSN-19	30:30	080 start	_____
(7)	A42/43*	AS4MH	33:09	120	_____
(8)	A38/39*	AS4MH	34:31	294	_____

b. Emitters which are more difficult:

	Platform	Radar	Time Up	Brg	Time to Word "Racket" *
(1)	S16	PLMFND	3:15	000	_____
(2)	S16	PEELGRP	4:34	000	_____
(3)	A11*	BBULGB	17:49	345	_____
(4)	S16*	PEELGRP	22:07	356	_____
(5)	S29	SNPTR1	22:14	029	_____
(6)	A19-22	PUFFBALL	33:35	278? start	_____
(7)	A44-46	AS-2	35:00	122? start	_____

* One or more don't come up consistently

Significance: This item (#9) and #1 seem to be the most important checks of operator proficiency. It would be interesting to see if it takes less time to report emitters that have been correctly classified by the SLQ than it does to report emitters incorrectly classified. Of additional interest is if the operator reports to the TAO first, as should be done. Note also that the initial word "Racket" is used for a latency measure because of variable rates of speech among operators.

RELATED MOPs: 13, 16, 17

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 30
(2 points for each ≤ 45 seconds, 1 for > 45 seconds)

10. How were surface fire control radars handled?

a. Were fire control radars reported before missile launch? (Y/N)
b. Was an emergency racket given for fire control radar? (Y/N)

	Platform	Radar	Displayed	Time Up	Brg	Y/N
(1)	S16	OWLSCH	OWLSCH	21:38	001	___
(2)	S16	PEELGRP	GEN MSL	22:07	001	___

Significance: In the scenario, two fire control emitters from a HOS SUR are acquired and displayed as a HOS SUR and a GEN MSL immediately before the platform launches two Styx missiles. Since both are fire control radars, and therefore indicators of impending hostilities, they should be reported quickly and as emergency rackets.

RELATED MOPs: 13, 17

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 4
(1 point for each "Y")

---

11. Were commercial platforms reported? (Y/N)

	Platform	Radar	Displayed	Time Up	Brg	Y/N
(1)	A10	RDR-1E	UNK	6:30	220	___
(2)	S18	Marconi	CR105A	17:30	253	___
(3)	S28*	Decca-40	UNK	34:25	320	___

* This does not come up consistently.

Significance: Whether or not commercial radars are reported may be dependent upon the operator's previous training and/or procedures aboard his individual ship. This check may be just descriptive of the EW's standard operating procedures.

RELATED MOPs: 12, 13

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 2
(1 point for each "Y")

---

12. Did operator give a "resume racket" report for new hostile emitters previously acquired? (Y/N)

Platform	Radar	Time Up 1st	Time Up 2nd	Brg	Resume Racket? Y/N
S16	PEELGRP	4:34	22:07	356	___

Significance: In the scenario one UNK emitter goes inactive and then is reacquired later. If the operator recognizes that the reacquired emitter is in fact the same emitter, he should pass a "resume racket" report.

RELATED MOPs: 13, 36

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 2
(2 points for a "Y")

---

13. Were hostile mode changes reported? (Y/N)

	Platform	Radar	Time	Brg	Y/N
(1)	A11*	BBULGB	17:49	345	___
(2)	A8*	BBULGA	20:30	293	___

Significance: Mode changes on HOS aircraft could be indications that ownship is being targeted or a data link has been established. This information is useful, and maybe even critical, especially to TAO.

*** NOTE: These don't seem to occur in the Environment Generator delivered scenario.**

RELATED MOPs: 13, 36

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 0
(2 Points for each "Y", 1 Point if reported as a new racket)

---

14. Were initial chaff launches reported? (Y/N)

	Against Platform(s)		Time Up	Brg	Y/N
(1)	A30/A31	SSN2C(Styx)	22:53	000	___
(2)	A55/A56*	SSN-19	30:30	080 start	___
(3)	A42/43*	AS4(Kitchen)	33:09	120	___
(4)	A38/39*	AS4(Kitchen)	34:31	294	___
(5)	A44-46	AS2 (Kipper)	35:00	122? start	___

* One or more of these don't come up consistently.

Significance: Reporting chaff launches should be automatic for any operator.

RELATED MOPs: 14, 28, 42

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 5
(1 point for each "Y")

15. Was the number of missiles launched reported correctly? (Y/N)

	Against Platform(s)	Correct Composition	Time Up	Brg	Y/N	Composition Not Reported
(1)	SSN-2C (Styx)	2	22:53	000	___	_____
(2)	SSN-19 *	2	30:30	080	___	_____
(3)	AS-4 (Kitchen)*	2	33:09	120	___	_____
(4)	AS-4 (Kitchen)*	2	34:31	294	___	_____
(5)	AS-2 (Kipper)	3	35:00	122??	___	_____

* One or more of these don't come up consistently.

Significance: As the missiles in the scenario undergo mode changes (i.e. "lock-on") new symbols for the missiles are displayed. Until the operator accesses the alert box around the initial missile symbols (now inactive), more than two missile symbols are displayed. Some operators will report more than the actual number of missiles because they have not realized that the missiles have undergone mode changes and the system is treating them as new emitters. While inaccurate composition reporting may or may not have an impact on tactical responses, this item is included since it may be indicative of an operator's understanding of the system display characteristics.

RELATED MOPs: 13, 17

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 10
(2 points for each "Y", 1 if "N" but other composition is reported, 0 for Not Reported)

- COUNTERMEASURES -

16. Was the DECOY STATUS screen accessed? (Y/N) ___

Significance: This is indicative of the operator's attempt to remain knowledgeable and current regarding available decoy resources.

RELATED MOP: 42

DATA SOURCE: DX UNIT

SCORE: NOT SCORED

---

17. Did operator launch chaff against a missile not targeting ownship? (Y/N) ___

Significance: Operators seem to initiate chaff launching automatically even if the detected missile is not an actual threat to ownship. One of the SSN-2Cs is not targeted at ownship; therefore if the operator does not launch chaff in response to this threat, it is assumed here that he has determined that ownship is not targeted.

Platform	Brg	Chaff Launched?

RELATED MOPs: 37, 42, 46

DATA SOURCE: DX UNIT

SCORE: ___ / 2
(2 points if "N", only if chaff was launched against other missiles listed in check #18)

---

18. Was chaff successfully reseeded to counter missiles? (Y/N)
(+ average time in seconds to reseed)

	Against Platform	Time	# Times Launched	Av Time to Reseed	Side Used (PF/SF/BOTH)	Tubes Used
(1)	SSN-2C	____	_____	_____	_____	____
(2)	SSN-19*	____	_____	_____	_____	____
(3)	AS-4*	____	_____	_____	_____	____
(4)	AS-4*	____	_____	_____	_____	____
(5)	AS-2	____	_____	_____	_____	____

* One or more of these don't come up consistently.

Significance: This is descriptive of an operator's training/experience in chaff launch procedures. Some operators only launch one round per missile group, others have been seen to reseed the chaff at about thirty-second intervals. Note that several operators had attempted to launch chaff but received (for one reason or another) an "Illegal Action" notification from the system.

RELATED MOPs: 30, 42

DATA SOURCE: DX UNIT/ VIDEOTAPE

SCORE: ___ / 5
(1 point if chaff launched)

---

19. Did operator engage targets with AECM? (Y/N)

Significance: This is indicative of either the operator's familiarity with alternative ASMD procedures or (more likely) his familiarity with the V(3) system. This check should be compared to the operator's SLQ-32(V) experience. If his experience only included V(2) then an "N" would not be surprising. If his experience included V(3), then an "N" would be more significant.

	FAB Used	Y/N	# Times	EFX(s) in Close Control
(1)	ECM Mode	___	_____	_____
(2)	ECM Engage	___	_____	_____
(3)	ECM Alternate Engage	___	_____	_____

RELATED MOPs: 44, 46

DATA SOURCE: DX UNIT

SCORE: ___ / 2 **!! DO NOT COUNT IF OPERATOR IS FROM A V(2) PLATFORM !!**
(2 points if used)

---

20. Did operator recommend course changes and/or EMCON in response to missiles? (Y/N)

Significance: Operators may recommend course and/or EMCON changes. Again, this is descriptive of the operator's training/experience in countermeasures, and may reflect more on procedures aboard individual ships.

	Platform	Recommendation Given? (Y/N)	If so, what was the Recommendation?
(1)	SSN-2C	_____	_____
(2)	SSN-19*	_____	_____
(3)	AS-4*	_____	_____
(4)	AS-4*	_____	_____
(5)	AS-2	_____	_____

* One or more of these don't come up consistently.

RELATED MOPs: 9, 35

DATA SOURCE: VIDEOTAPE

SCORE: ___ / 10
(2 points for each "Y")

- SYSTEM OPERATION -

Note recommendation that the checks under this subsection be dropped from assessment (scoring) and retained for descriptive data only. (E.g., see comment on check #24, and also because there seems to be little correlation with rest of subsections.)

21. Did operator turn Speaker OFF? **(Y/N)**

Significance: The speaker gain can be turned down to inhibit new emitter alerts. An operator who turns the speaker OFF is left with only visual cues that a new emitter has been acquired. This may be used in conjunction with other checks, such as #5, to determine why an operator may "miss" some hostile emitters.

RELATED MOPs: 29

DATA SOURCE: DX UNIT

SCORE: ___ / 1
(1 point for an "N")

---

22. Did the operator access other FABs: **(Y/N)**

FAB Used	# Times
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Significance: Once again, this is useful in describing how well the operator exercises/exploits the SLQ-32 capabilities. This may be used in conjunction with other checks such as #5 to determine why an operator may "miss" some hostile emitters.

RELATED MOPs: 23, 29

DATA SOURCE: DX UNIT

SCORE: ___ / 1
(1 points if other FABs accessed - Primarily for descriptive purpose)

---

23. **NEW** How many times was "ILLEGAL ACTION" displayed? ____

Significance: This figure represents operations attempted on the SLQ without success and could indicate errors in procedural knowledge of the operator.

---

24. Were inactive emitter symbols retained on the polar display? (Y/N) ___

Significance: One operator was careful to HOOK (instead of SEQ to) emitters on the polar display so that the symbology would not be dropped after the emitter went inactive. This was apparently to help him preserve the picture of the tactical situation and/or keep a readily available history of previously identified emitters. Note that if an emitter was to go inactive and later be reacquired, the operator would be expected to give a "resume" report.

RELATED MOPs: 25, 29

DATA SOURCE: DX UNIT/VIDEOTAPE

SCORE: ___ / 2
(2 points for a "Y")

---

25. Did the operator attempt to clear the outer ring of the display? (Y/N)

Significance: Some operators redesignate known hostile emitters as either friends or as generic missiles in order to unclutter or clear the outer ring of the wagonwheel. This check is one descriptor of how the individual operator exploits the capabilities of the SLQ-32. Note, however, that these are not approved techniques and may have detrimental effects on system/operator performance.* Therefore, recommend revising scoring to provide only descriptive data and not contribute to a rating of competency.

RELATED MOP: 29

DATA SOURCE: DX UNIT/VIDEOTAPE

SCORE: ___ / 0 **(Note that score has changed to "0".)**

* Isn't recommended because:
(1) SLQ doesn't update PRI, Freq, etc. of emitters which are designated missiles
(2) of system integration with other displays.

---

26. Was system preempt/countertargeting used on (potential) threat bearings? (Y/N)

Significance: If threat emitters occur or are likely to occur on certain bearings, operators may establish preempts in anticipation of higher threat emitters.

RELATED MOP: 45

DATA SOURCE: DX UNIT/VIDEOTAPE

SCORE: ___ / 2
(2 points for a "Y")

NEW 27. Was the ESM Inhibit function used on reoccurring emitters? (Y/N)

Significance: In the scenario, some emitters (especially those operating in Band 1) are dropped and then reacquired by the system shortly thereafter. Likewise, some air tracks leave multiple symbols on the display as they "fly by". This check is similar to check #25 in that it represents a fast technique to clear such emitters from the polar display. There is a risk in using this FAB, however, in that alerts for new emitters which may occur at the time may be cleared from the display as well.

RELATED MOP: 29

DATA SOURCE: DX UNIT

SCORE: ___ / 1
(1 point if used)

NEW 28. Did the operator manually enter scan information on emitters? (Y/N)

Significance: The operator has the option of entering scan information on an emitter in close control by pressing the ENTRY FAB and entering a numeric "3". The scan information can be derived by timing the scan period using a stop watch. Use of this feature aids in rapid identification of emitters and implies greater familiarity with system functions.

EMITTER IN CLOSE CONTROL	SCAN ENTERED

RELATED MOP: 29

DATA SOURCE: DX UNIT

SCORE: ___ / 2
(2 points if used)

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